DOCUMENT RESUME

ED 068 690 VT 017 192

TITLE	The World of Manufacturing, 1970-71. A Junior High School Industrial Technology Exemplary Program. Final Report.
INSTITUTION	Pontiac City School District, Mich.
PUB DATE	71
NOTE	72p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Achievement Tests; *Curriculum Evaluation; Developmental Programs; Educational Research; *Industrial Arts; *Junior High School Students; *Manufacturing Industry; Post Testing; Pretesting; *Program Evaluation; Research Projects
IDENTIFIERS	*Exemplary Projects

ABSTRACT

The World of Manufacturing is an Industrial Arts Curriculum Project designed to acquaint junior high school students with all the major phases of the manufacturing industry. This publication reports the evaluation of a World of Manufacturing program implemented into the Pontiac School District during the 1970-1971 school year. During the summer of 1970, teachers who were to be responsible for implementing the program attended inservice training session at Ohio State University. The project was then undertaken in five Pontiac junior high schools, where 300 seventh, eighth, and ninth graders participated in the 2-semester course. Evaluation of the program was accomplished through pre- and post-program administration of an achievement test developed for the World of Manufacturing program. Analysis of the achievement test results indicated significant gains in post-test performance for seventh and eighth graders but loss or lack of gain for ninth graders. Also, a higher number of correct responses were obtained on 37 of the 50 items when the pre- and post-test results were compared. These two findings indicate that the program met its objectives related to achievement, but the significance of these results with respect to education is questionable. Student reaction to the program and reports on the budget and dissemination activities are included. (SB)

ED 068690

WORLD OF MANUFACTURING
1970-71
EXEMPLARY PROGRAM
JUNIOR HIGH SCHOOLS
PONTIAC, MICHIGAN

VT 017192

FILMED FROM BEST AVAILABLE COPY

ED 068690

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

Final Report

A Junior High School Industrial Technology Exemplary Program

The World of Manufacturing 1970-71

School District of the City of Pontiac

Donald W. Kaiser
Supervisor
Vocational Education

Contents . . . . . .

Project Supervisor's Report, John Hovis
Budget Report
Approved Budget
Accounts Summary
Evaluation Report, Dr. Merle Smith
Dissemination Report, Dr. Gerald Jennings

WORLD OF MANUFACTURING

Final Report by

Project Supervisor

The I.A.C.P. World of Manufacturing was instituted in the Pontiac System September 1970. The program was placed in five of our six junior high schools. The five schools were designated after the teachers and principals of those schools agreed to participate in the necessary preparation. This step was important because the teachers had to go to Ohio State University for three weeks training. The principals also had to make some schedule changes and adjustments.

The teachers showed enthusiasm in their preparation during their training at OS.U. The work that they did in trying to make teaching aids, models and understand the use of three books was tremendous. From our three weeks' working at O.S.U. and the help received from the teachers from the field centers, we were ready for the program to begin.

The World of Manufacturing was quite well received by the students from the very beginning. Their enthusiasm of the program was high due to the manufacture of the rocket. The program had its ups and downs, depending on the amount of reading and paper work being done. These problems were not insurmountable but they did require much teacher energy. The students which caused the most problems were those who had previous shop experiences and still wanted to make individual products. For this reason, it is strongly suggested that the World of Construction proceed the World of Manufacturing. The vocabulary and reading assignments raised some problems by parents, students and other teachers. The reason was because this was the first experience they had with the industrial arts classes doing something else besides making individual projects. This should not be considered as something too hard for these eighth grade students. As junior high students, they take basic science and have to learn a vocabulary and have reading assignments. The idea that the industrial arts classes have a unique vocabulary plus a set of terms and reading assignments which must be done doesn't fit into the old role teachers have grown to know. The World of Manufacturing will continue to require more exposure and understanding by the staff and administration. Just because I.A.C.P. is different doesn't mean that the program is too hard or easy. Give it a chance.

As a demonstration center this year, we were quite busy. Our visitors included parents, teachers, and administrators. The administrators ranged from superintendent to local building administrators; also future industrial education teachers came to observe and ask questions. There wasn't any special trend which was set except that after the Articulation Conference at Eastern Michigan University and Michigan Industrial Education Society convention, there were increases in the visitations. The total number of visitors has been over two hundred, and they have come from as far away as the Newberry district in the Upper Peninsula. The majority of the visitors were given a visitor response form so that we might have some feedback concerning their observations of the program. Dr. Ploughman from Western Michigan University has been receiving the visitor response forms and tabulating the information. His data is contained in the evaluation section of the Summary Report for the World of Manufacturing.

There have been many different experiences for all those concerned with the manufacturing program. The growth of each teacher has been evident. The one big plus factor in this growth has been the weekly meeting with all the manufacturing teachers. These meetings were used to distribute new materials and supplies and requisitions which had been placed. The reporting of each teacher's progress for the previous week also kept the teachers working harder. Nobody likes to be bringing up the tail of the program. The means by which each teacher solved a particular

problem was passed on so that all concerned would benefit. The opportunity to talk over our problems and also successes helped build the moral of each teacher. The success of a new type program such as I.A.C.P. Manufacturing is greatly increased if there are two or more teachers. They can get together and help each other along. As proof of the previous statement, Pontiac schools have been doing this and the programs are succeeding because of it. In fact, two new teachers have been qualified to teach the I.A.C.P. because of in-service weekly meetings. At our meetings each week the teachers were paid at an in-service rate. I would recommend that the teachers be paid something for their time and effort because of the overall effect it has on the program.

There are a few recommendations which I think should be made. There should be some special attention given to ordering supplies. This is very important if there will be a number of different schools involved. This supply order should go through one person so that the small quantities could be combined for a better price break. The same procedure should be followed for equipment. A possible suggestion for the person who could combine these orders would be one of the Manufacturing teachers. He would work with the vocational director or industrial arts consultant and the purchasing director. The wide variety of supplies needed requires someone who can explain the items and why that particular item is needed. The program is difficult to teach from the standpoint that it is conceptual instead of project oriented, without having required supplies substituted.

The success of the program depends upon a number of factors. I cannot stress the following statement too much. The teacher designated to teach the Manufacturing program must be a willing teacher. He must be sold on the conceptual approach to teaching industrial arts and not stress the individual project. These teachers must be willing to spend extra time either before or after school. This extra time should be spent doing some extra preparation or having students come in and refine their own product after distribution. I believe that this is very important because it helps get the teacher more involved with the students. It is also a lever to use for class control and cooperation. If the student doesn't help the group or class he is in, he is denied the privilege of extracurricular work.

The I.A.C.P. is harder to teach the first year than any traditional industrial arts program. The following years become easier because the teacher becomes more familiar with the concepts and can explain them much better as well as following the materials easier. His work must be always changing because of the product changes which must be made to keep the program up-to-date. The I.A.C.P. has been a tremendous boost for the industrial arts classes. All our teachers believe that the program and effort expended has been worthwhile. Personally, I would not like to teach the traditional classes again for the seventh and eighth grades. The World of Manufacturing has much potential for growth and relevancy. Improvements must be made and they will be as soon as more teachers are prepared and schools are using the program.

Another area of consideration for the World of Manufacturing is equipment and supplies. Most of the equipment that was secured for the program this year was the hand variety. These items were very important plus a few items were increased. As an example, the metal hand punch could be increased from two to three. The overhead projector and table is a must. Some sort of a slide projector which will accept eighty slides or more as a unit should be bought. The Kodak Carousel with a filmstrip adaptor would be just great. These two pieces of A.V. equipment are used extensively. Another item recommended is either a polaroid camera or if that is too expensive, a Kodak instamatic camera. The opportunity to take pictures of your students and replace some of the prepared slides adds a personal touch to the program.

The usual equipment found in a general metal shop will work very well for Manufacturing. There are a few other pieces of equipment which should be bought or made available from the woodshop. The band saw is one item which is used for a variety of required operations. This band saw doesn't need to be big and expensive. The saw should be equipped with a fence and miter. A twelve inch Craftsman bandsaw from Sears-Roebuck for under two hundred dollars complete, will do nicely. A small disk and belt sander should be secured. These two machines are not normally found in the metal shop but they are used throughout the year's course work. The rest of the equipment found in the teachers' guide or material equipment list should be followed as budgets allow.

The supplies present another unique problem. The reason for this is the variety of items which cross other type classes. An example would be rolling pins for the clay.

The supplies in some respects are difficult to come by or hard to secure in the quantity that is needed. It is for this reason I suggested one person to coordinate the supply orders. Some of the quantities are quite small. If it is at all possible, a small amount of money should be set aside for the teacher to use as petty cash and buy some items locally as needed. Also, some items need to be secured a short time before they are going to be used. The reason for this is that they have a short shelf life. The rubber latex for making the balloons, coating the mallett handles, clear cast and polystyrene foam are a few of the items which have a limited shelf life.

The program will succeed depending on the equipment and supplies being available when they are needed. There were a good many times when I had to go out and buy something to substitute for items which were late in being delivered or not enough of them. I cannot stress the importance of this aspect too much.

The Advisory Committee met at the Pontiac School District Board Offices several times. These meetings were conducted on Wednesday evenings, starting at 7:30 p.m. and usually lasted two to three hours. The attendance for the first meeting was very good with most of the parents present. The meetings that followed were not very well attended. This was the first time I had ever tried to form an advisory committee and I thought it was very good. That is, I thought the representation of the community resources were good. The attendance continued falling until the last meeting when there were only twelve people present and one of them was giving an outside report.

I was very disappointed that more of the principals and parents didn't attend or send someone who would fill in for them. For the last meeting, I only had calls from two of the members telling me why they would be unable to attend. I didn't call as many meetings as was suggested; instead I called them when some pertinent information was ready for reporting and discussion.

As I have already mentioned, this was my first advisory committee and, no doubt, I made a number of mistakes. I am sure that much more use could have been made of the resources available if I would have asked. It would also help in the future if other advisory committee members would volunteer some help and ideas.

This school year, 1970-71, has been very stimulating for me and also much learning has taken place on my part. I believe that the World of Manufacturing for eighth grade industrial arts is the best thing that has happened in many years. The I.A.C.P. World of Manufacturing program has been success as far as I am concerned. I have visited all the junior highs involved several times a week and have seen the students in action. What I have observed, in the main, is growth and enthusiasm. This kind of results has come about only through the efforts of many people. The five Manufacturing teachers we have used this year have put forth much effort and time, making this program really a success. I want to personally thank Messrs. Jeter, Chang, Robinson, Book, and Guthrie for their help and cooperation without which my assignment as supervisor would have been impossible.

The principals also cooperated very well whenever I needed their help. A number of the visitors who had the opportunity to meet and talk with some of the principals commented on the help and cooperation which they, the visitors, received. Several times the enthusiasm of the principals for the program was mentioned.

The central office personnel were of great help, especially the purchasing department. The help and cooperation Mrs. Ann Flynn and the girls in the purchasing department gave me was just marvelous. Thanks to them the requisitions were assigned P. O. numbers and sent on their way without delay. As a result of this type of cooperation, the Manufacturing teachers received the needed equipment and supplies on time.

Last but not least is the tremendous help I received from Don Kaiser, industrial arts consultant for Pontiac Schools. It would be impossible to recount the many ways in which Don has helped and guided me. The opportunity to work with Don has been greatly appreciated. Much of my professional growth this year, I believe, has been as a direct result of the guidance and example Don has set for me. Next year I will miss the close association I had with Don. I am looking forward to continued work with him in the coming year. The secretary, Mrs. Longair, has patiently helped me in typing my reports and requisitions. The work Mrs. Longair has done for me has been greatly appreciated.

Because of all the work by everybody in the Pontiac School System, the two I.A.C.P. programs, The World of Construction and the World of Manufacturing, have met with much success. I believe that the World of Manufacturing should be kept in the five junior high schools which have it presently and also expanded to the sixth junior high. The World of Manufacturing offers so much more for student learning and growth than anything we have ever done in our industrial arts program in the past. It should receive top priority for junior high curriculum change.

Respectfully submitted,

John C. Hovis

John C. Hovis
Local Supervisor

BUDGET REPORT

The budget estimate for this proposal was much more accurate than the "World of Construction" budget estimate for the previous year. Additional expenditures were made from the budget and approved by the Michigan State Department of Education. These expenditures are noted in the paragraphs where such expenditures took place.

A statement explaining deficits, additional expenses or unusual occurances of the budget paragraphs appears below.

Paragraph 1.1

A formal agreement made with Eastern Michigan University for consultant services for the budget amount is contained with the proposal. The amount used was $20.85 less than the amount budgeted.

Paragraph 1.2

Dissemination activities were slightly higher than anticipated so this account shows a deficit of $96.48. Programs and exhibits were presented at Eastern Michigan University workshops and at the Michigan Industrial Education Society convention.

Paragraph 1.3

This budget item shows a balance of $96.59. The money was primarily used for in-service training at weekly meetings held throughout the year and for dissemination activities..

Paragraph 2.1.2 and 2.1.6

The budget amount for each of these accounts was sufficient to cover the training of the teachers for the start of the school year but due to the loss of two of these teachers during the year necessitated the training of two additional teachers. The training of the two new teachers was approved by the State Department of Education and was accomplished during the past summer and their expenses were taken from these accounts.

Paragraph 3.2 and 3.3

Considerable money was left in these two budget accounts because the percentage added to cover increase in prices was more than actually needed and the fact that larger quantities being purchased at one time lowered the cost.

The cost per student based on actual cost is as follows:

Written Instructional Materials	$10.00 per student
Laboratory tools and equipment	$12.69 per student
Laboratory Supplies	$11.14 per student
Specialized IACP Hardware	$10.00 per student
Total	$43.83 per student

$1,428.22 was added to the cost of the project and not in the budget. This is added cost as per State of Michigan letter dated June 3, 1970 from Michigan Public Employees' Retirement System.

VII. BUDGET

	Exemplary Program Monies*
1. Personnel	
1.1 Demonstration Center consultant (teacher educator from Eastern Michigan University) on contract(see Appendix, Exhibit D).	$2379.00
1.2 Local Supervisor For in-service training with teachers and guidance counselors, evaluation meetings, and advisory committee meetings. Dissemination activities as required.	1500.00
1.3 Teachers, based on $1000/year - five teachers, for in-service training, evaluation meetings, and advisory committee meetings. Dissemination activities as required.	5000.00
1.4 Two-fifths salary of local supervisor	5000.00
Sub-total Personnel	$13879.00
2. Travel and Associated Costs	
2.1 Summer Teacher Orientation Session	
2.1.1 Personnel travel, 5 trips based on transportation cost of $45 (5 teachers)	225.00
2.1.2 Teacher stipend, based on 15 working days and one day of travel at $50/day (Includes room and board and compensation at the in-service rate)	4000.00
2.1.3 Instructional materials needed for teacher orientation sessions	IACP supplied No charge.
2.1.4 IACP regular staff for orientation sessions	IACP supplied No charge.
2.1.5 Pro-rated cost for experienced teachers for teacher education sessions, based on 15 working days at $60/day and transportation cost of $150 - (Proportion of Pontiac teachers attending to all teachers enrolled)	400.00
2.1.6 Tuition, fees, for 4 quarter hour summer session enrollment at $125.00/participant, (5 teachers)	625.00
2.2 Mid-year evaluation conference, 7 persons, lodging meals and transportation (2 cars) 3 days, plus pay for substitutes	1000.00

*Part D, PL. 90-576

2.3 IACP staff consultation visit, 4 trips, each based on $100/day consultant fee and $100/day for travel and expenses	$800.00
2.4 Evaluation	2000.00
2.5 Dissemination consultant (30% of costs of Eastern Michigan University - see Appendix, Exhibit E)	3000.00
2.6 Local staff travel and expenses for visitations and meetings	400.00
Sub-total Travel and Associated Costs	$12450.00
3. Supplies and Materials	
3.1 Written instructional materials, based on $10 per student per year for a total of 500 students	5000.00
3.2 Laboratory tools and equipment based on one laboratory per school, $1500/laboratory	7500.00
3.3 Laboratory supplies based on number of classes per school with 25 students per class - Eastern $1875, Jefferson $1125, Kennedy $1125, Lincoln $1875 and Madison $1500	7500.00
3.4 Specialized IACP instructional hardware, $1200 per laboratory - from Ohio State Foundation	6000.00
3.5 Shipping costs for items 3.1 - 3.4	200.00
Sub-total, Supplies and Materials	$26200.00
TOTAL BUDGET	$52,529.00

VIII. SCHOOL DISTRICT OF THE CITY OF PONTIAC CONTRIBUTIONS

1. Salary of four teachers	$32,464.00
Three-fifths salary of teacher supervisor	7,500.00
Ten per cent of Vocational Director's salary	2,200.00
Five per cent of five principals' salaries for increased administration of program	5,000.00
Total Salary Contribution	$47,164.00

2. A laboratory in each of five junior high schools, presently equipped with the normal metalworking machines and tools, will be furnished by the School District.

October 25, 1971

ACCOUNTS SUMMARY

Below are listed the account expenditures as reported by the School District Accountant.

	ACCOUNT NO.	BUDGET AMOUNT	EXPENDITURES
WLD/M EMU CONSULTANT	1731.087.631	$2,379.00	$2,358.15
WLD/M SUPR IN SVC	1702.087.631	1,500.00	1,596.48
WLD/M TEACHER IN SVC	1703.087.630	5,000.00	4,903.41
WLD/M SUPR SALARY	1702.087.632	5,000.00	4,867.60
WLD/M SUMMER TRAVEL	1760.087.631	225.00	225.00
WLD/M TEACH STIPEND	1729.087.630	4,000.00	4,772.00
WLD/M IACP TEACHERS	1734.087.630	400.00	350.00
WLD/M TUITION REIMB.	1733.087.630	625.00	853.00
WLD/M MID YEAR CONF	1761.087.630	1,000.00	589.91
WLD/M IACP CONSULT	1731.087.632	800.00	785.37
WLD/M EVALUATION EXP.	1742.087.631	2,000.00	1,981.96
WLD/M DISSEMINATION	1769.087.630	3,000.00	3,000.00
WLD/M SUPR TRAVEL	1760.087.632	400.00	393.85
WLD/M INSTR MAT	1742.087.632	5,000.00	5,000.00
WLD/M LAB EQUIPMENT	1794.087.631	7,500.00	6,344.96
WLD/M LAB SUPPLIES	1742.087.633	7,500.00	5,570.86
WLD/M IACP HARDWARE	1794.087.632	6,000.00	5,000.00
WLD/M SHIPPING COST	1794.087.633	200.00	186.80
WLD/M RET. & SOC. SEC. EXP.	1781.087.630	0	1,428.22
		$52,529.00	$50,207.57

TOTAL EXPENDITURES 50,207.57
TOTAL REVENUE TO DATE . . . . -35,325.00

14,882.57

Signed:

Donald W. Kaiser

1.

Evaluation Report

World of Manufacturing

A Junior High School Industrial
Technology Demonstration Program
1970-71

Merle Smith Ph.D.
Office of Evaluation
Pontiac Schools

Evaluation Report
World of Manufacturing

This is a report of the product evaluation carried out on the World of Manufacturing program in the Pontiac School District.

Description of the Program

The World of Manufacturing is an Industrial Arts Curriculum Project (IACP) designed to acquaint the student with all the major phases of the manufacturing industry. The program was written at Ohio State by Dr. Willis Ray and Dr. Donald Lux.

The curriculum is written for junior high students. The texts work-book, and teacher guides are supplied by Ohio State. Teachers attended inservice training sessions at Ohio State during the summer of 1970. The sessions were designed to train teachers to implement the program.

There were also periodic citizen advisory board meetings at which the project director gave status reports to the members. The teachers met on a weekly basis to discuss particular problems and make needed revisions in the weekly plan of operations.

The basic objective of the program was to teach students the various procedures used in the manufacturing industry as well as exposing the student to the broader context of industrial technology. Students worked on various projects throughout the two semester course. Unlike many industrial arts courses, the production of a particular model or object is not a primary objective of the World of Manufacturing Course. Rather, the project serves as a means by which the students learn the technology of manufacturing. Specific skills are not the focus: the focus is on processes and inter-relationships of man and industrial technology.

3.

The project was undertaken in five junior highs in the city of Pontiac. Seventh, eighth, and ninth graders participated in the two semester course.

Research Procedures

The evaluation design for the "World of Manufacturing" endeavors to ascertain whether or not the program attains its given objectives. The objectives of the program are as follows:

1. Enables students to understand the concepts, principles generalizations, problems, and strategies of industrial technology.
2. Encourages an interest in and an appreciation for industry as that element of economic system that provides industrial material goods for the satisfaction of human wants.
3. Provides knowledge and skills that will be useful in life situations of occupations, recreational, consumer, and socio-cultural significance.

Objectives one and three are measured by the Comprehensive Achievement Test provided by Ohio State University. This test is a criterion referencedtest which was designed specifically for the World of Manufacturing curriculum.

The second objective is measured by the use of student questionnaires and interviews. Visitor reactions were ascertained through use of a questionnaire. An attempt was made to obtain parental reaction through a telephone survey.

Data Collection and Analyses Procedures

Students were given the Comprehensive Achievement Test, World of Manufacturing, Form 2 at the beginning of the program (September 1970) and the same test was given in June of 1971. Both the pre and post achievement tests were scored by the data processing unit at Oakland Intermediate School District.

The World of Manufacturing comprehensive examination is a criterion related test consisting of fifty items. The reliability of the test as computed by Kuder-Richardson Formula 20 is .853. This coefficient is based on the post test data for the total group. A coefficient of .762 was obtained on the seventh grade group and a coefficient of .885 for the eight grade group. The reliability for the small sample of fifteen ninth graders, however, is only .224 which is unsatisfactory for meaningful interpretation of the data.

A readibility study carried out in connection with the evaluation indicated that the vocabulary level of the test was on the college level. This readibility study, however, was carried out using the Dale-Chall formula and the list of common words. Since the test items contain many technical words, such a procedure does not give a complete picture of the reading level of the test. Personal communication with Dr. Ray, Co-Director of IACP indicated that a more appropriate procedure for determing the reading level of the test involves the application of the Rutgers readibility formula devised by Fry. (Fry, 1970) Using the Rutgers readibility graph, the test is found to have an eighth grade reading level. Because of the relatively high reading level, teachers were asked to read the question and answers along with the students.

A pacer analysis was used to determine in what areas the students evidenced growth. (Joos, 1970) Pacer analysis examines percentages of students responding to each answer on a multiple answer test. The t test for correlated means described by Garrett was used to determine the significance between pre and post test means. (Garrett, 1959) The latter statistical tests were done with the assistance of personnel from the Pontiac Schools Data Processing Center.

The student questionnaires given at the end of the first and second semesters were examined in regards to the number of students responding in the various categories. Students were also interviewed by members of Educational Services and Products, Inc. Visitor reactions were obtained by giving the visitors a reaction form to fill out and mail directly to Educational Services and Products. The number of replies to each question were tabulated.

One attempt was made to secure the impression of parents through a telephone survey. This procedure however did not work successfully thus no parent reaction results are available at this time.

Results

The first part of this section will report on the findings regarding student growth as measured by the World of Manufacturing, comprehensive examination. Table I gives the pre test means and standard deviations. The summary statistics are based on a total of 300 students. Only individuals having complete, scoreable pre and post data constitute the total sample of 300 students.

Table I

Pre Test Means, Standard Deviations: World of Manufacturing Comprehensive Examination

Grade Level	N	Mean	SD
7th	94	14.84	5.08
8th	191	15.25	6.01
9th	15	12.87	4.84
Total	300	15.01	5.69

Table II below gives the summary statistics for the post test data.

Table II

Post Test Means, Standard Deviations, World of Manufacturing Comprehensive Examination

Grade Level	N	Mean	SD
7th	94	18.46	6.69
8th	191	17.68	10.74
9th	15	12.20	2.68
Total	300	17.67	9.45

Inspection of Table II reveals that the mean scores continue to be low when it is considered that the comprehensive examination has a total of fifty possible points.

Table III gives the mean gain scores made by the three groups and the t tests carried out to determine the significance of the gain scores.

Table III

Mean Gain Scores - t tests

Grade Level	Pre-Test Mean	Post-Test Mean	Gain	df	t
7th	14.84	18.46	3.62	94	3.62 **
8th	15.25	17.68	2.43	190	2.66 **
9th	12.87	12.20	-.67	14	-.46 ns
Total	15.01	17.67	2.66	299	4.06 **

ns= Non-significant
**= Significant .01 level

From Table III it can be seen that the mean gain made by the total group in significant in a statistical sense. Both the seventh and eighth grade groups show significant gains whereas the ninth grade group showed a loss or lack of gain. While the gains are deemed statistically significant, the actual gain appears to be of little magnitude. It is questionable to what extent such gains can be interpreted as having significant educational implications.

The loss evidenced by the ninth graders could have several possible explanations. The school has had some disruptions during the school year so that the students did not attend classes on days that the school was closed. Another possibility is that the small size of the sample (n=15) having both pre and post data does not represent the ninth grade population at the school enrolled in the World of Manufacturing curriculum. There were two changes in teachers during the school year. Nothing is known at this time regarding testing conditions at the time the post tests were given: adverse testing conditions could explain the loss. It is also noted that the reliability of the test for ninth graders is extremely low. The reliability coefficient established by Kuder Rediardson Formula 20 is .224. A coefficient that low suggests that for

this particular group, the test lacks sufficient reliability.

Without more data it is not possible to clarify with any degree of certainty the reason for the net loss shown by the ninth graders.

The data derived from the post tests of the comprehensive examination were also subjected to a pacer analysis which permits examination of the percentage of students responding correctly to each item. The following tables indicate the percentage of students giving the correct response to the items. The question stems are included in the table. The reader is referred to the appendix where a complete test is included.

Table IV

Percentage of Correct Responses
Total Group

Item Stem	Percent Correct Pre-Test	Post-Test
1. A conversion process changes raw materials into	40	25
2. Which of these statements would come from a sales forecast?	35	35
3. Which is not one of three general stages in developing a design solution?	26	29
4. As a factory supervisor, you learn that some components are too long after shearing. You will first	52	39
5. Which of these terms best identifies the economic system used in the U.S. today?	19	41
6. A thermostat that measure and controls temperature represents which principle of automation?	23	24
7. A survey to find out what kind of product people want to buy is a?	27	38
8. Servicing a product is sometimes also called?	25	33
9. Three basic ways of separating materials are?	38	44
10. The printing process that put ink on this page was a?	36	48
11. An example of chip removal is?	23	32

Table IV continued		Pre-Test	Post-Test
12.	Which product is a non-durable good?	52	46
13.	The products shown in Figure 1 probably were assembled by what process?	32	12
14.	When material is refined, any leftover substance that has no further use is regarded as a?	53	44
15.	A corporation's name, purpose, and how it will be financed are all stated in the?	20	28
16.	Which step occurs before actual production begins?	35	36
17.	A common way to get money to start a corporation is by	11	47
18.	Which of these is not a basic stage of primary metals processing?	32	39
19.	About three-fourths of America's business sales are made by?	35	29
20.	Set-up cost is the cost of?	32	31
21.	The "Industrial Revolution" was?	26	21
22.	An economic system based on free enterprise is closly related to?	31	32
23.	In tooling up for production, the last step probably would be?	30	35
24.	Mechanical, radiant, nuclear, chemical, heat, and electrical are classes of?	47	40
25.	Forging, bending, and drawing operations occur in what forming processes?	23	34
26.	Heating metal and then letting it cool slowly, so that it will be more useable in manufacturing, is an example of a?	35	42
27.	The most economical way to make the automobile fender shown in Figure 2 is by?	24	24
28.	Which one of these managers is specially trained to be a work-measurement specialist?	27	40
29.	Which of these groups is in charge of tooling-up for production?	21	30
30.	Which is not a physical property of materials?	35	36
31.	Which is not a basic way of forming material?	22	27

Table IV continued	Pre-Test	Post-Test
32. Which of these events was not part of the Industrial Revolution?	31	34
33. In a factory, the receiving, unpacking, and storing of input materials can be classified as?	23	29
34. Two basic purposes of shearing are to?	27	15
35. If some parts of a product must be taken apart and put back together frequently, they should be held together by?	12	70
36. Small bits of material are lost along the parting line during?	44	47
37. Removing and clearning a spark plug is an example of?	35	40
38. Forging is done by what types of forces?	31	35
39. "Machine time" and "man time" are concepts used in?	31	39
40. The people who define problems and develop solution for computers are called?	19	20
41. Which group of items are material-converting practices?	28	33
42. The chart in Figure 3 would be used in what type of production control?	30	36
43. Which of these is not a reproducable raw material?	24	29
44. The stencil shown in Figure 4 can also be called a?	25	20
45. Which of these will reduce the change of error in quality control?	19	26
46. Which product was invented within the past twenty-five years?	25	28
47. To test the quality of light bulbs, a few from each production lot are tested. Choosing a few items for testing--rather than the whole lot--is called?	19	23
48. Which of the following would not force a corporation to go out of business?	26	31
49. The process of a corporation's going out of business is called?	24	25
50. A corporation is run by its?	18	24

Table IV points out that when a comparison of the number of correct responses are made between pre and post tests, a higher percentage of correct responses occur on thirty-seven of the items. Again many of the changes of pre and post percentage of correct responses are of a small magnitude and some could occur merely by chance. Thirteen of the items showed a decrease in the precentage of students giving the correct response.

Examination of Table IV can be used by teachers to determine particular units which need to be stressed during the 1971-72 school year.

Summary-Discussion of Achievement Test Results.

Comparisons between pre and post mean scores indicate that statistically significant gains were made by seventh and eighth graders in the program with the ninth graders showing no gain. A higher number of correct responses were obtained on thirty-seven of the fifty items when on the pre and post tests were compared. These two findings indicate that the program met its two objectives related to achievement.

A closer examination of the data, however, reveals that while the gains were significant, they were of small magnitude. The computed post test means are considerably below what one would expect on a criterion related test having a high degree of content validity. The low mean score obtained by the ninth graders can be explained on the basis of the low test reliability for that group as well as the general disruptive conditions at the particular school during the last school year. Possible explanations for the small gain in scores could take the form of the following assumptions:

1. The test does not measure exactly what is taught in the classes.

2. The test vocabulary is not an integral part of the curriculum.

3. There is too long of a time lag between course content presentation and the administration of the test.

4. Teachers are not adequately prepared to teach the World of Manufacturing curriculum.

The above assumptions or hypotheses could be tested out with and evaluation design providing for process evaluation and collection of interim achievement data.

The next section of this report includes the results of the analyses done on the first and second semester student questionnaires.

Student Reaction to the World of Manufacturing Program First Semester 1970-71

Student views of the first semester of the World of Manufacturing were measured by a questionnaire given to students on the program. Table V below shows the number of yes and no answers to the first 11 questions.

Table V
Number of Yes and No Responses
Direction of Attitude

Question Number	YES	NO	Attitude
1	215	90	Positive
2	208	96	Positive
3	137	166	Negative
4	110	195	Positive
5	124	210	Positive
6	232	74	Positive
7	178	126	Negative
8	261	41	Positive
9	189	117	Positive
10	115	188	Negative
11	194	109	Positive

QUESTIONS FOR STUDENT EVALUATION OF THE INDUSTRIAL ARTS CURRICULUM PROJECT

"The World of Manufacturing"
First Semester

1.	Do you feel the things you have done and learned during this semester in this class were as interesting and exciting as what you originally thought?	YES	NO
2.	Were the things you have done and learned this semester in this class as interesting and exciting as any other things you ever did before in industrial arts?	YES	NO
3.	If you really knew at the beginning of the semester what you now know about this program, would you want to do it all about the same way again?	YES	NO
4.	Would you rather make projects such as garden trowels, funnels and other metal objects instead of working with the tools and materials used in manufacturing technology?	YES	NO
5.	If you really knew at the beginning of the semester what you now know about this program, would you want to be placed in a different class?	YES	NO
6.	Would you advise your best friend to enroll in the IACP Program?	YES	NO
7.	If you really knew at the beginning of the semester what you now know about this program, would you want to do less studying?	YES	NO
8.	Do you feel that what you studied in this class helped you understand what the manufacturing industries are all about?	YES	NO
9.	If you really knew at the beginning of the semester what you now know about this program, would you want to start over and do a better job of studying?	YES	NO
10.	Do you feel that what you learned in this class helped you understand some of your other classes, such as mathematics, science, social science or English any better?	YES	NO
11.	Has the manufacturing technology class helped you like school more this year than before?	YES	NO

The results of Table V indicate that in general students express positive views toward the first semester of the World of Manufacturing course.

The negative response pattern to question 3 suggests that students may have some ideas of changing the course. Question number 7 was also answered in the negative direction but again the meaning is not clear. Perhaps it reflects the students' desire to do less studying. This probably would hold for any course the student is taking.

The responses to question 10 indicates that students do not see a relatioship between the World of Manufacturing and other subjects. They may indicate a need for change in the presentation of materials so that more relationships can be brought out.

The manner in which the students responded to question number six indicates that students are very positive in their attitude toward the program. The fact that over 76% of the students reply that they would advise their best friend to take the course strongly indicates that students view the program in a positive manner.

The replies to question 8 indicate that the large majority of students, 82%, feel that the course has helped them understand the World of Manufacturing. Evidently the course instructors are conveying the content of the course in a meaningful manner.

Analysis - Second Half

Student Questionnaire (First Semester)

At the end of the first semester students were given a questionnaire designed to elicit their reactions to the course. The analysis of the

First half of the questionnaire was reported to the Advisory Board in February of 1971. The remaining items were subjected to item analysis.

The students were asked to indicate the content areas of the World of Manufacturing that they viewed as having the most value in terms of learned materials. Two-hundred-eighty-nine questionnaires were available for analysis. On pages 15 and 16 the items and number of students responding in each category are shown. On the following page the items are rank ordered in terms of the frequency counts.

Inspection of the rank order list indicates that the students view stories of primary metals, Textile Mill Products, Petroleum Products, or Chemical Products as being the most productive in terms of learning. This is followed by the item "Manufacturing Technology".

The item which the students view as the least productive in terms of learning was "Refining the Design Solution". In general the rank order of the items suggests that the students see the importance of the content of the World of Manufacturing course. There is less value attached to items concerning the economic impact of the manufacturing industry and the labor aspects of the industry. Somewhat unfortunate in some respects is the low rank order of the item.

"Employment and Occupations in Manufacturing". Hopefully the course content would contain more of a career guidance componant so that students would become aware of the career patterns in the manufacturing field.

NUMBER OF STUDENTS' ANSWERING EACH CATEGORY

12. Which parts of "The World of Manufacturing" do you feel you learned the most from? (Check the best choice for you on each unit heading)

Table VI

	I LEARNED			
	A Lot	Some	Not Much	Nothing
Man and Technology	86	140	51	12
The Evolution of Manufacturing	86	144	44	15
Manufacturing and the Economic System	109	110	54	16
Manufacturing Technology	152	100	28	8
Manufacturing Management Technology	125	117	30	16
Researching and Developing	148	99	27	14
Designing Manufactured Goods	107	136	32	13
Creating Alternate Design Solutions	104	107	60	17
Making Three-Dimensional Models	86	117	57	28
Refining the Design Solution	79	121	53	35
Engineering the Product	110	105	61	12
Designing Power Elements	105	106	44	33
Making Working Drawings	107	119	42	20
Building the Production Prototype	127	106	35	20
Technical Writing and Illustrating	86	116	58	28
Obtaining Approval of Management	107	118	51	12
Planning Production	99	127	46	16
Planning Processes	88	140	48	11
Designing and Engineering the Plant	94	122	56	16
Supplying Equipment and Materials	89	133	41	25
Employment and Occupations in Manufacturing	70	135	52	30
Automating Processes	120	94	37	36
Tooling Up for Production	98	140	40	10
Installing Production Control Systems	83	128	56	21
Processing Data or Information	125	101	41	21
Using the Computer	86	122	59	21
Inputs to Manufacturing	90	122	61	15
Organization, Ownership and Profit	105	105	55	23
Identifying Consumer Demands	83	132	48	25

Table VI continued

	I LEARNED			
	A Lot	Some	Not Much	Nothing
Operating Quality Control Systems	119	118	32	19
Measuring Work	79	130	57	22
Estimating Cost	106	116	51	15
Hiring and Training	100	129	38	21
Manufacturing Personnel Technology	70	148	56	14
Manufacturing Production Technology	88	129	48	23
Organized Labor and Collective Bargaining	94	115	55	24
Working, Advancing, and Retiring	109	117	50	12
Establishing Accident Prevention Programs	127	105	39	17
Securing Reproducible Raw Materials	114	112	47	15
Extracting Raw Materials	123	109	44	12
Harnessing Energy from Nature	157	82	34	15
Manufacturing Production Technology	168	77	27	16
Converting Raw Materials to Industrial Materials	177	73	23	15
Making Industrial Materials into Standard Stock	181	69	22	16
Stories of Primary Metals, Textile Mill Products, Petroleum Products or Chemical Products	232	32	13	11

Table VII

RANK ORDER

Items on which Students Learned Most

Rank	
1	Stories of Primary Metals, Industrial Products
2	Manufacturing Technology
3	Converting Raw Materials to Industrial Materials
3	Making Industrial Materials into Standard Stock
4	Researching and Development
5	Manufacturing Production Technology
6	Designing Manufactured Goods
7	Harnessing Energy from Nature
8	Tooling up for Production
9	Making Working Drawings
10	Manufacturing Management Technology
11	Operating Quality Control Systems
12	Building the Production Prototype
13	Establishing Accident Prevention programs
14	Hiring and Training
15	Planning Processes
15	The Evolution of Manufacturing
16	Man and Technology
16	Planning Production
16	Processing Data or Information
16	Working, Advancing, Retiring
16	Securing Reproducible Raw Materials
17	Making three Dimensional Models
17	Obtaining Approval of Management
18	Supplying Equipment and Materials
18	Estimating Cost
19	Manufacturing and the Economic System
20	Manufacturing Personnel Technology
21	Identifying Consumer Demands
21	Engineering the Product
21	Designing and Engineering the Plant
22	Automating Processes
23	Inputs to Manufacturing
24	Installing Production Control Systems
24	Designing Power Elements
24	Creating Alternate Design Solutions
25	Organization, Ownership, Profit
26	Measuring Work
26	Organized Labor and Collective Bargaining
27	Using the Computer
28	Employment and Occupations in Manufacturing
29	Technical Writing and Illustrating
30	Refining the Design Solution

An item analysis was also done on the student questionnaires given at the end of the second semester. Table VIII gives the frequency count for the first eleven items.

Table VIII

Frequency Count - Student Questionnaire Responses

Second Semester

		YES	NO	Attitude
1.	Exciting	172	54	Positive
2.	Interesting	162	64	Positive
3.	Make Object	82	144	Positive
4.	Advise Friend	157	69	Positive
5.	Prefer Different Class	83	143	Positive
6.	Understanding	177	49	Positive
7.	Transfer	104	122	Negative
8.	Like School More	128	98	Positive
9.	Career	146	80	Positive
10.	Occupation Choice	126	100	Positive
11.	Study More	115	111	Positive

12. Which parts of "The World of Manufacturing" do you feel you learned the most from? (Check the best choice for you on each unit heading)

Table IX

	I LEARNED			
	A Lot	Some	Not Much	Nothing
[illegible]. Material Forming Practices	59	113	39	15
13. Casting or Molding	85	114	20	7
14. Compressing or Stretching	58	106	49	13
15. Conditioning Material	53	104	54	15
[illegible]. Making Assemblies or Finished Products	98	82	38	8
17. Material Separating Practices	70		54	14
18. Shearing	81	101	32	12
19. Combining Components	72	100	35	19
20. Chip Removing	90	90	32	14
21. Separating by Other Processes	61	103	50	12
22. Bonding	66	100	46	14
23. Coating	80	101	30	15
24. Mechanical Fastening	58	106	40	22
25. Mixing	79	84	47	16
[illegible]. Combining Subassemblies	90	110	32	14
27. Preparing for Distribution	61	103	50	12
28. Servicing Manufactured Products	66	100	46	14
29. Story of Printed Products	80	101	30	15
30. The Manufacturing Corporation	58	106	40	22
31. Forming a Corporation	79	84	47	16
32. Locating the Plant and Securing Inputs	65	110	35	14
33. Relating People to the Corporation	71	80	54	21
34. Making the Sales Forecast	46	86	69	25
35. Designing and Engineering the Product	77	89	44	16
[illegible]. Obtaining Capital, Estimating Profits, and Keeping Records	66	83	55	22
37. Planning Production Processes	55	109	46	18
38. Establishing Production and Quality Control	55	91	55	25
39. Making and Combining Components and Assemblies	73	83	47	13
40. Arranging for Distribution and Sales	62	100	46	18
41. Liquidating the Corporation	47	87	50	42
42. Manufacturing in the Future	47	82	52	45
43. Story of the Telephone	47	53	23	103

QUESTIONS FOR STUDENT EVALUATION OF THE INDUSTRIAL ARTS CURRICULUM PROJECT

"The World of Manufacturing"
Second Semester

1. Do you feel the things you have done and learned during this year in this class were as interesting and exciting as what you originally thought? YES NO

2. Were the things you have done and learned this year in this class as interesting and exciting as any other things you ever did before in industrial arts? YES NO

3. Would you rather make projects such as garden trowels, funnels and other metal objects instead of working with the tools and materials used in manufacturing technology? YES NO

4. Would you advise your best friend to enroll in the IACP program? YES NO

5. Would you rather have been in a different kind of class, other than manufacturing technology during this year? YES NO

6. Do you feel that what you studied in this class really helped you understand what the manufacturing industries are all about? YES NO

7. Do you feel that what you learned in this class helped you understand some of your other classes, such as mathematics, science, or social science? YES NO

8. Has the manufacturing technology class helped you like school more this year than before? YES NO

   If you said "yes" to #8 would you tell why this class helped you like school more this year?

9. Do you feel the things you have studied in manufacturing technology will be of help to you in deciding what career to follow after you graduate from high school? YES NO

10. Do you feel you would like to work in some phase of a manufacturing industry as an adult? YES NO

11. Would you like to study more about some parts of "The World of Manufacturing" in high school? YES NO

    If you said YES to question #11, what kinds of things would you like to study more about in manufacturing?

Again the results suggest that the students hold many positive attitudes toward the World of Manufacturing curriculum. However students continue to express the view that the content of the manufacturing technology does not aid in the understanding of content in other courses. This consistent finding indicates that the curriculum of the technology course is not perceived by students as being related to other disciplines.

Students were asked to indicate the units within the curriculum that was most productive for learning. The frequency counts for the four possible categories to each question are given in Table IX.

Next the items were rank ordered in terms of the frequency counts. The rank order is given in Table X.

Table X

Rank Order
Items on which students
Learned Most (N=226)

1	Making assemblies or finished products
2	Combining Subassemblies
2	Chip removing
3	Casting or molding
4	Coating
4	Story or printed products
5	Forming a corporation
5	Shearing
6	Mixing
7	Making and combining components and assemblies
8	Designing and engineering the produce
9	Material seperating practices
10	Relating people to the corporation
11	Combining components
12	Bonding
12	Servicing manufactured products
12	Obtaining capital, estimating profits, and keeping records
13	Locating the plant and securing inputs
14	Seperating by other processes

Table X continued

14	Preparing for distribution
15	Arranging for Distribution and sales
16	Material forming practices
17	Compressing or stretching
17	Mechanical fastening
17	The Manufacturing corporation
18	Planning production processes
18	Establishing production and quality control
19	Conditioning material
20	Liquidating the corporation
20	Manufacturing in the future
20	Story of the telephone
21	Making the sales forcast

The rankings shown on Table X indicate that during the second semester, students viewed the making of assemblies or finished products the most productive units in terms of learning the World of Manufacturing curriculum. The unit dealing with the making of a sales forcast was least productive in terms of perceived learning on the part of students.

Generally, the most important units, as far as students are concerned, deal with concrete, relatively specific activities and skills. More abstract concepts as reflected by the units such as manufacturing in the future, the manufacturing corporation, and liquidation procedures are viewed by students as being relatively non-productive. A similar trend was descerned when unit rankings on the first semester questionnaires were made.

Student reaction was also ascertained through student interview data. Representatives from Educational Services and Products, Incorporated interviewed students. This independent, external study of student reaction is discussed next.

STUDENT RESPONSES
TO
THE PONTIAC JUNIOR HIGH SCHOOLS INDUSTRIAL
TECHNOLOGY EXEMPLARY PROGRAM: IACP WORLD OF MANUFACTURING

A randomly chosen group of five students for each of eight World of Manufacturing classes were interviewed to obtain their reactions to this industrial arts program. The set of questions used earlier to evaluate the program formed the basis for this interview. Rather than a simple Yes-No response, each of the five students was asked to indicate on a five point scale their reactions to each question. Discussion was encouraged and recorded on a cassette tape for later review and abstraction. These tapes will be merged to form a single half-hour tape of student reactions to the World of Manufacturing program in Pontiac. The questions are attached. Following are student responses to the questions.

1. Interest-

Like it, move around.
Buzzers didn't turn out.
Like building group - get done quicker.
Is uninteresting - don't like to do the bookwork.
Burgler alarms didn't work right. Made wrong - wasn't enough time. Would rather work alone - if mess up, whole class is mad because you ruined their alarms. If work alone and it doesn't work it is only your own fault.
Real - liked working in groups. Got done faster.

2. Comparison to previous classes-

Like better than previous classes.
Larger variety of things.

3. Keep the program the same-

Assembly line did not work well - parts missing. Some didn't know there jobs. If do over, would rather work by themselves. Want more tools to work with.
Get rid of buzzer. If worked by self, might be able to make it better.
Nobody worked together, didn't stay organized (buzzer). Put the buzzer at the end of the year.
Black and white students worked together okey.
Hard to work together.
Would like to work on cars. More wood products. Some kids don't like to do things because they have to them in a group. When work in groups, some pupils ask others to do their work, they just sit around, expecting others to do their job.
Need more time to work on items.
Work on real cars. Don't talk to instructor as far as changes.

4. Make other metal objects-

Nothing we do on assembly line turns out too good.
Four out five want to work together on projects.
Would like to make items useful at home. Working together is generally ok. Sometimes when working together, some guys mess up on purpose and make one good for themselves.
Would like to use more wood.

5. Different class-

Get hard classes over first (math), relax in this class. Some guys goof off, some pranks.
Have problems with set-up and clean-up with early and late classes.
Not enough equipment. Equipment stolen.
Would like less homework, less written work. Like being active, not just talking.

6. Advise friend-

Yes, this class and other shop classes.
Learn how to use more tools.
Like to work with friends.

7. Less studying-

More studying.
Study for tests.
If more time spent studying, less time for work.
Didn't expect tests to be so hard. Learn more about materials before work with it.

8. Understand manufacturing industries-

Less goofs in industry (class items didn't work).
Pleased with class.
Would like to see work on electricity.
On assembly line you learn one job that you can do. Get help from others.
Helped understand hardships in manufacturing. Course keeps you busy, don't have time to goof off.

9. Better job of studying-

(Did not discuss) covered under number 7.

10. Helped understand other classes-

Helped in science - area of soil used in shop work.
Helped in science, math, and reading.
No transfer between classes.
Helped by more reading - learned reading. Helps in math because of measuring.
Help both ways. Math helps most. Like school more because of this class.

11. Helped like school more-

We make things rather than just read and write and sit. Can move around.
I don't want to get behind.
Liked school better because technology class is a time when do what I want, makes rest of day go good. Would like class to last 2 hours.
Like more - make things. Less pressure than other classes.

12. Parent's opinion-

Improved grade in math.
Show things to parents and they approve.
Learn how to use parent's tools. Talk about this class at home.

13. Student's opinion-

Like class despite instructor.
Don't like to study terms. Drop the alarm.
No racial problems. Put more things in books. Like group work.

INTERVIEW
QUESTIONS FOR STUDENT EVALUATION OF THE
INDUSTRIAL ARTS CURRICULUM PROJECT

"The World of Manufacturing"

Response Form:

1.	Very Interesting	29 (1)	___ (2)	10 (3)	___ (4)	1 (5)	Dull
2.	(skip)						
3.	Same	7 (5)	8 (4)	13 (3)	10 (2)	2 (1)	All Different
4.	All Other Products	4 (1)	3 (2)	9 (3)	9 (4)	16 (5)	Same Products
5.	Different Class	2 (5)	___ (4)	___ (3)	___ (2)	33 (1)	Same Class
6.	Encourage	22 (1)	8 (2)	5 (3)	___ (4)	___ (5)	Avoid
7.	More Study	14 (1)	13 (2)	11 (3)	1 (4)	1 (5)	Less Study
8.	Helped Understand	30 (5)	9 (4)	1 (3)	___ (2)	___ (1)	No Help
9.	(skip)						
10.	Helped Other Class	8 (5)	12 (4)	9 (3)	5 (2)	6 (1)	No Help
11.	Parent's - Like Opinion	21½ (5)	7 (4)	10 (3)	1½ (2)	___ (1)	Do Not Like
12.	Pupil - Like Opinion	24 (5)	10 (4)	___ (3)	1 (2)	___ (1)	Do Not Like
13.	Like Better	25 (1)	8 (2)	7 (3)	___ (4)	___ (5)	Worse

Hrs/Subject

SCHOOL: Cumulative Freq.

CLASS HR.: 38

The above data gathered from student interviews substantiate the findings from the questionnaires filled out by the students. The comments made by the students generally are of a positive nature. At the same time, the students point out problems within the course content and areas which need to be changed.

The majority of students find the course to be of high interest to them. The majority of students indicate that they would encourage their friends to take the course and that the course content would remain approximately the same. Striking too is the finding that being enrolled in the World of Manufacturing increased the liking of school. The interview data also supports the earlier finding that there is not a clsoe relationship between the curriculum and other courses. On question ten where the students are asked if the World of Manufacturing curriculum aides in the understanding of other courses, twenty students indicated that it was of some help while twenty students indicated little or no help.

The student reaction data indicates that the course does encourage interest on the part of the students and engenders positive attitudes toward manufacturing technology. The second objective of the program, then, is deemed to have been met by the program.

To get impressions from other educators, a questionnaire was devised by Educational Services and Products and given to visitors to the program. The completed questionnaires were mailed by the visitors to Educational Services and Products, Inc. This procedure proved to be faulty in that there was a extremely low rate of returned, completed questionnaires.

Generally, the visitors reviewed the program in a positive manner: They perceived the course content as relevant and as a means to encourage student success and motivation. The visitors also pointed out some program defects such as spare limitations and cost.

VISITOR RESPONSE TO THE PONTIAC JUNIOR HIGH SCHOOLS INDUSTRIAL TECHNOLOGY EXEMPLARY PROGRAM: IACP WORLD OF MANUFACTURING

The Pontiac EACP World of Manufacturing program has received attention by a number of visitors interested in the merits of this exemplary industrial arts program. To capture visitor reactions to the program, a visitor response form was distributed to those viewing the program. Following are the results of a tabulation of their responses. The response form is attached.

A.. Characteristics of the IACP World of Manufacturing Program.

	Characteristics	Frequency of Response- Emphasized	Not Stressed
1.	Educationnaly Sound	11*	1
2.	Flexible and Adaptable	6	5#
3.	High Student Motivation	11*	1
4.	Student Success Experiences	11*	-
5.	Teaching Effectiveness	9	1
6.	Program Efficiency	6	3
7.	Occupational Orientation	9	1
8.	Content Relevancy	12*	-
9.	Decreased Discipline Problems	8	3
10.	Organized Knowledge	10	1
11.	Language Development	9	3
12.	Behavioral Objectives	9	2
13.	Cost of Program Established	7	6#
14.	Teacher Education	11*	1

* Items where emphasis was noted by most respondents.

\# Items noted as receiving relatively little stress.

Number of respondents was 16

Comments by Respondents-

1. Great program for beginning teacher since everything is planned for you.
2. Program is one-sided in that it tends to glorify working in a factory a little too much.
3. Casual observations indicate that funds might not be adequate or shop area large enough for the number of students involved.

B. Integration of Men, Machines, and Materials.

Involvement	(Low) 1	2	3	4	5 (High)	
		Judgements-				
Pupils with Instrictor-		1	4	3	8	-Avg. 4.1
Pupils with Program Materials-		1	2	4	8	-Avg. 4.0
Pupils with Equipment-	1	1	4	6	3	-Avg. 3.4

Comment by one Respondent-

Too many pupils and they apparently weren't entirely eager to go ahead.

C. Attributes Influencing Initiation of Program - Comments.

I might use to help introduce students to some of the aspects of industry, but as it stands now I don't think that I would base my whole program on the IACP Program.

High student motivation, occupational orientation, and student success experiences.

Organization, uniform coverage, identification of broad concepts and relationships.

Would not initiate at this time due to limited information feedback as to actual accomplishment of program.

Sound behavioral objectives; the context is relevant to todays world, and IACP is much better than what we teach now.

High Motivation.

Low cost per pupil expense - can include more students in our shop area. Sounds like a much improved program.

Student involvement and satisfaction.

The concept approach rather than the skills approach seems worthwhile to interest kids in something.

Completeness of coverage.

Well planned materials, daily lessons, variety of projects.

D. Previous Experience with Program by Respondents.

No prior contact - 14 visitors

Some exposure - 2 visitors

Number having previewed materials: No - 7 visitors
Yes - 9 visitors

Preview Locations - Haven Hill Conference
Michigan State University
Central Michigan University - course
Dr. Jennings, Eastern Michigan University
West Junior High, Ypsilanti, Michigan
Dowagiac Public Schools, Michigan

Submitted by: T. Ploughman
E.S.P., Inc.

VISITOR RESPONSE

THE PONTIAC JUNIOR HIGH SCHOOLS INDUSTRIAL TECHNOLOGY EXEMPLARY PROGRAM: IACP WORLD OF MANUFACTURING

The IACP World of Manufactoring program is a focal point for many industrial arts educators across the nation. To capture visitor reactions to the program and particularly the program as it exists in Pontiac's Junior High Schools, we ask that you provide us with critical responses to the following questions:

A. The IACP World of Manufacturing program you have reviewed is intended to emphasize the following characteristics:

1. Educationally Sound	8. Content Relevancy
2. Flexible and Adaptable	9. Decreased Discipline Problems
3. High Student Motivation	10. Organized Knowledge
4. Student Success Experiences	11. Language Development
5. Teaching Effectiveness	12. Behavioral Objectives
6. Program Efficiency	13. Cost of Program Established
7. Occupational Orientation	14. Teacher Education

Pontiac staff members would appreciate your response to what you have observed and discussed relative to specific examples of apparent emphasis or lack of attention to certain of the above listed characteristics. Please express your opinion freely.

Emphasis Noted - (comments)	Circle Characteristics Emphasized
	1 5 9 13 2 6 10 14 3 7 11 4 8 12

Deficiencies Noted - (comments)	Circle Characteristics Not Stressed
	1 5 9 13 2 6 10 14 3 7 11 4 8 12

VISITOR RESPONSE - IACP World Of Manufacturing

B. The IACP World of Manufacturing program focuses on how industry integrates men, machines, and materials into efficient production systems. What did you observe about Pontiac's program that illustrates success towards this goal?

Involvement - (comments)	Your Judgement
Pupils with Instructor -	Low __ __ __ __ __ High
Pupils with Program Materials -	Low __ __ __ __ __ High
Pupils with Equipment -	Low __ __ __ __ __ High

C. Based upon your review of the Pontiac program and prior understanding of IACP World of Manufacturing please identify those attributes which would influence you to initiate such a program.

D. What has been your experience with the IACP World of Manufacturing program?

1. Are you presently using the program?

   No __ Yes __ When Implemented _____ yr.

2. Have you previewed materials previous to today?

   No __ Yes __ Workshop _____(where, when)

   School Setting _____(where, when)

   _____

3. The following information is optional:

   Name _____ Position _____

   Educational System _____

   Address _____

   _____

Summary

The evaluation of the World of Manufacturing indicates that the three program objectives were met:

1. students increased their knowledge of industrial technology.
2. students increased skills related to manufacturing technology.
3. high interest was deomonstrated by the students.

Statistically significant achievement gains were made by the seventh and eighth grade groups while ninth graders showed no gain. The gains, while statistically significant, are small and the actual quantitative mean scores are quite low when it is considered that the measure used to test achievement is a criterion related test: that is, the test is based directly on the curriculum. Few of the items were given correct responses by the majority of students and the actual achievement must be considered as minimal despite the significance of the gain scores. Possible reasons for this relatively low level of achievement are discussed in the report.

High student interest and positive attitudes relative to the course was evidenced by student questionnaires, student interviews, and visitor responses.

Recommendations

1. Analysis should be carried out on the periodic achievement tests rather than basing the evaluation solely on a pre-post basis.
2. Curriculum revisions need to be made by teachers after close scrutiny of the item analysis completed on the comprehensive examination.
3. The curriculum needs to be more flexible allowing more time for units showing relatively low achievement.

Bibliography

Fry, D. The Rutgers Reading Program Journal of Industrial Arts Curriculum May-June 1970

Garrett, H. Statistics in Psychology and Education - Longmans, Green and Company 1959

Joos, L. W. Pacer - A Methonology for Program Evaluation in School Systems - Oakland Schools, Pontiac, Michigan 1970

Ray, W. Personal Communication - February 1971

APPENDIX

1. A conversion process changes raw materials into

   A. more raw materials
   B. consumer finished goods
   C. primary materials
   D. industrial materials

2. Which of these statements would come from a sales forecast?

   A. There is a supply of labor available
   B. Production equipment is adequate
   C. Raw materials can be bought
   D. There would be a large market for the product

3. Which is not one of three general stages in developing a design solution?

   A. Constructing a mock-up
   B. Sketching and making rough models
   C. Developing a production flowchart
   D. Research

4. As a factory supervisor, you learn that some components are too long after shearing. You will first

   A. check the quality-control procedures at the shearing machine
   B. order a new machine
   C. fire the machine operator
   D. change the detail drawing for the part

5. Which of these terms best identifies the economic system used in the U.S. today?

   A. Bartering
   B. Monetary
   C. Utilitary
   D. Trading

6. A thermostat that measures and controls temperature represents which principle of automation?

   A. Mechanical handling
   B. Data processing
   C. Feedback
   D. Program control

7. A survey to find out what kind of product people want to buy is a

   A. planning survey
   B. sales survey
   C. production survey
   D. consumer survey

8. Servicing a product is sometimes also called

   A. pre-processing
   B. post-processing
   C. processing
   D. producing

9. Three basic ways of separating materials are

   A. shearing, chip removal, and other separating practices
   B. casting, molding, and conditioning
   C. compressing, stretching, and mixing
   D. coating, bonding, and mechanical fastening

10. The printing process that put ink on this page was a

    A. mixing process
    B. bonding process
    C. coating process
    D. mechanical fastening process

11. An example of chip removal is

    A. shearing
    B. chemical separating
    C. thermal erosion
    D. drilling

12. Which product is a non-durable good?

A. Screwdriver
B. Table
C. Musical instrument
D. Shirt

13. The products shown in Figure 1 probably were assembled by what process?

A. Batch assembly
B. Continuous assembly
C. Lot assembly
D. Minimum production assembly

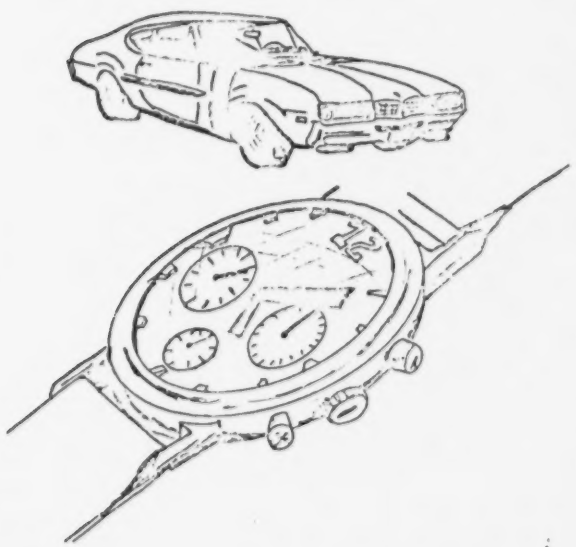

FIGURE 1

14. When material is refined, any leftover substance that has no further use is regarded as a

A. by-product
B. waste material
C. reproducible material
D. standard stock

15. A corporation's name, purpose, and how it will be financed are all stated in the

A. deed
B. charter
C. liability
D. stock

16. Which step occurs before actual production begins?

A. Distribution
B. Servicing
C. Finishing-off
D. Tooling-up

17. A common way to get money to start a corporation is by

A. taxing the workers
B. taking orders for the product
C. selling refreshments to the workers at a profit
D. selling stock

18. Which of these is not a basic stage of primary metals processing?

A. Refining ore
B. Converting raw materials to pure metals and alloys
C. Forming metal into standard stock
D. Designing a product for the market

19. About three-fourths of America's business sales are made by

A. corporations
B. partnerships
C. proprietorship
D. the federal government

20. Set-up cost is the cost of

A. doing one operation on one production unit
B. getting ready to do an operation
C. buying one component part
D. setting items on an overhead conveyor belt

21. The "Industrial Revolution" was

A. a revolt of workers against their employers for better wages
B. a revolution between two industries
C. the invention of a steam engine, which made factories absolutely necessary
D. the change from making goods by hand to making goods by machine

22. An economic system based on free enterprise is closely related to

A. communism
B. socialism
C. capitalism
D. isolationism

23. In tooling up for production, the last step probably would be

A. conducting a trial run
B. choosing the operations
C. providing jigs and fixtures
D. estimating the cost of tooling up

24. Mechanical, radiant, nuclear, chemical, heat, and electrical are classes of

A. materials
B. energy
C. tools
D. processes

25. Forging, bending, and drawing operations occur in what forming processes?

A. Casting and shearing
B. Compressing and stretching
C. Conditioning and separating
D. Bonding and combining

26. Heating metal and then letting it cool slowly, so that it will be more usable in manufacturing, is an example of a

A. compressing or stretching process
B. conditioning process
C. shearing process
D. coating or bonding process

27. The most economical way to make the automobile fender shown in Figure 2 is by

A. stamping
B. casting
C. thermal conditioning
D. chip removal

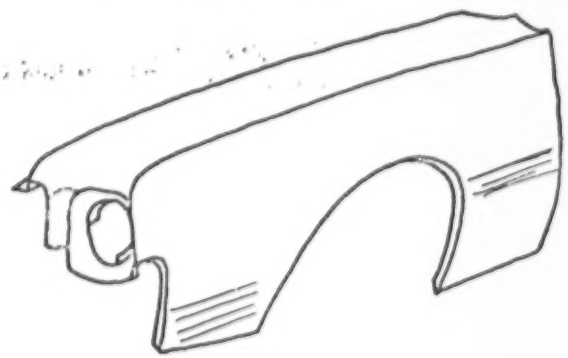

FIGURE 2

28. Which one of these managers is specially trained to be a work-measurement specialist?

A. Computer analyst
B. Vice President of marketing
C. Time-study analyst
D. Office manager

29. Which of these groups is in charge of tooling-up for production?

A. Time-and-motion study group
B. Material-handling group
C. Final-inspection group
D. Industrial engineering group

30. Which is not a physical property of materials?

A. Hardness
B. Ductility
C. Weight
D. Cost

31. Which is not a basic way of forming material?

A. Casting
B. Compressing
C. Stretching
D. Chip removal

32. Which of these events was not part of the Industrial Revolution?

A. The change from hand-made goods to machine-made goods
B. The invention of the wheel
C. The use of mechanical power to drive machines
D. The growth of the factory system of production

33. In a factory, the receiving, unpacking, and storing of input materials can be classified as

A. personnel induction
B. post-processing
C. processing
D. pre-processing

34. Two basic purposes of shearing are to

A. divide material and give it shape
B. crumble and shred material
C. increase the amount of material and its strength
D. make the material flat and smooth

35. If some parts of a product must be taken apart and put back together frequently, they should be held together by

A. fusion bonding
B. conversion coating
C. mechanical fastening
D. adhesives

36. Small bits of material are lost along the parting line during

A. casting
B. chip-removal
C. shearing
D. stretching

37. Removing and cleaning a spark plug is an example of

A. processing
B. maintenance
C. altering
D. automating

38. Forging is done by what types of forces?

A. Casting and pouring
B. Shearing and chip removing
C. Hammering and continuous squeezing
D. Mixing and bonding

39. "Machine time" and "man time" are concepts used in

A. marketing research
B. advertising
C. work measurement
D. sales prediction

40. The people who define problems and develop solutions for computers are called

A. systems analysts
B. section supervisors
C. technicians
D. key-punch operators

41. Which group of items are material-converting practices?

A. Sorting, screening, washing
B. Pasteurizing, distilling, evaporating
C. Fabricating, building, constructing
D. Extracting, mining, excavating

42. The chart in Figure 3 would be used in what type of production control?

A. Advertising
B. Marketing
C. Inventory
D. Research & development

ITEM	QUANTITY	SIZE
Washers (flat)	591	1/2"
Stove bolts	213	3/8"x2"
Nuts (hex)	1 gross	6-32 NC
Machine Screws	7 dozen	4-40 x 1/2"

FIGURE 3

43. Which of these is not a reproducible raw material?

A. Meat
B. Wood
C. Eggs
D. Petroleum

44. The stencil shown in Figure 4 can also be called a

A. chuck
B. template
C. burr
D. trammel

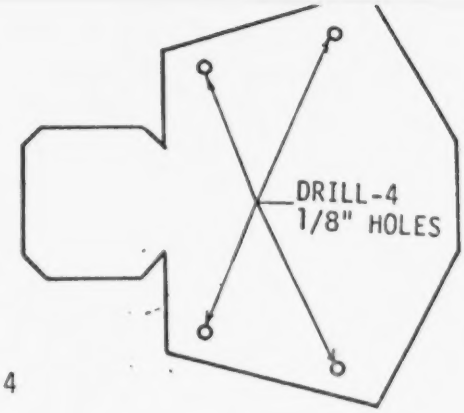

FIGURE 4

45. Which of these will reduce the chance of error in quality control?

A. Jigs and fixtures
B. Washers and nuts
C. French curves and dividers
D. Scribers and scratch awls

46. Which product was invented within the past twenty-five years?

A. Telephone
B. Fluorescent lamp
C. Transistor radio
D. Airplane

47. To test the quality of light bulbs, a few from each production lot are tested. Choosing a few items for testing--rather than the whole lot--is called

A. selecting
B. specifying
C. statistics
D. sampling

48. Which of the following would not force a corporation to go out of business?

A. Bankruptcy
B. Failure to give bonuses to older employees
C. Failure to meet state obligations
D. Lack of activity

49. The process of a corporation's going out of business is called

A. dissolution
B. resolution
C. declaration
D. application

50. A corporation is run by its

A. stockholders
B. staff
C. directors
D. production workers

MID-YEAR SUMMARY REPORT OF A DISSEMINATION PROGRAM

for the

INDUSTRIAL ARTS CURRICULUM PROJECT

Submitted by

Dr. Gerald L. Jennings
Associate Professor

Department of Industrial Education
Eastern Michigan University

April, 1971

MID-YEAR SUMMARY REPORT OF A DISSEMINATION PROGRAM

Background

During the summer of 1970, a proposal was prepared to provide a dissemination program for the Industrial Arts Curriculum Project (IACP) in the State of Michigan during the 1970-71 school year. Final approval and funding to support such a program were obtained by October 1, 1970. As designed, the dissemination program was to be a joint effort of the State Department of Education, the Department of Industrial Education at Eastern Michigan University, and the Associated General Contractors of America, Detroit Chapter. The person appointed as director of the program was Dr. Gerald L. Jennings, Associate Professor of Industrial Education, Eastern Michigan University. The following is a summary of the major efforts of Dr. Jennings in directing the attention of Michigan educators to the Industrial Arts Curriculum Project during the period of October 1, 1970 to March 31, 1971.

Generally, the plan of action in the dissemination program involved first the preparation of mailing materials to all junior high school teachers and curriculum coordinators for industrial arts in the State of Michigan. The limited availability of a mailing list for this purpose provided only about 700 names and addresses for direct mailing of a letter containing brochures and an invitation to use the services of Dr. Jennings. Very little response was received from this mailing until the month of December, 1970. Upon receipt of any inquiries by mail or telephone, a response was made by Dr. Jennings to offer assistance in the form of special presentation or conferences with key school personnel.

Beyond the initial mailing of information to industrial arts teachers in October, 1970, other broad spectrum dissemination efforts involved a curriculum articulation conference on the Eastern Michigan University campus in February during which the IACP was the topic of discussion, and a mailing in February, 1971, to all public school superintendents in the State of Michigan. From the frequency of responses during the months of February and March, it would be easy to conclude that these two events have had the most significant impact in directing the interest of Michigan educators to the Industrial Arts Curriculum Project.

Record of Dissemination Activities

OCTOBER, 1970

Article prepared for the Michigan Industrial Education Society Journal to focus attention on the dissemination program for the Project.

Letter and mailing list prepared to inform junior high school industrial arts teachers and coordinators of the existence of the IACP and the availability of Dr. Jennings as a state disseminator for the Project. See Appendix A for sample of material in the mailing.

Attended Haven Hill Conference, Highland, Michigan, to discuss the Project with individual teachers and administrators.

Inquiries received from the following:

Ypsilanti Public Schools; Mr. Harold Lounsberry, Cooperative Education Instructor. Extended discussion was held on possible uses of the Project in the Ypsilanti Public Schools.

Visit made to the following:

Detroit Public Schools administration building. Conducted brief conference with consultant for industrial arts for Detroit on the feasibility of implementing the IACP in Detroit schools.

NOVEMBER, 1970

Began preparing publicity materials for the annual curriculum articulation conference to be held in February, 1971, on the Eastern Michigan University campus. Conference planned with theme of "The Industrial Arts Curriculum Project". Dr. Willis E. Ray, Co-Director of the IACP was chosen as the keynote speaker.

Visits made to the following:

Redford Union Public Schools. Made presentation on the Project to key administrative officials and industrial arts teachers. Response was quite favorable toward the uniqueness of the Project. A great deal of concern for implementation was expressed by Mr. Daniel Dohany, a junior high school teacher who has received training in the use of the Project. Doubt was expressed over the availability of funds to support such a curriculum change.

Wayne State University, College of Education. Made presentation to graduate class in vocational education. Class included about 35 teachers and administrators from Detroit area schools. Real interest was expressed by several students, but little opportunity for extended discussion was provided.

Lansing. Met with Mr. Arthur Hansen to discuss the dissemination program.

DECEMBER, 1970

Due to the holiday vacation period, very little dissemination activity developed. Further planning for the articulation conference was conducted.

Visit made to the following:

Flint Public Schools. Met with the director of vocational education and his assistant to discuss the possibility of using the IACP program materials in Flint during the 1971-72 school year. They are presently using a curriculum similar in structure in two junior high schools.

JANUARY, 1971

Received inquiries from the following:

Warren Woods Public Schools; Mr. James D. Vlaz, Director of Vocational Education. No further word was received following a letter of response.

Midland Public Schools; Mr. Herman Gieseler, Supervisor of Industrial Education. Arrangements made for visit to meet with teachers.

Visits made to the following:

Eaton Rapids Public Schools. Made presentation to seven teachers and administrators from that school system. Invitation had been extended by the superintendent of that system, though no further interest has been indicated for implementation.

Saginaw Public Schools. Met with administrators in vocational education to discuss feasibility of implementing the Project on a pilot basis in the Saginaw schools. Implementation dependent upon budgetary factors. Two teachers have indicated an interest in using Project materials.

Ypsilanti Public Schools. Made presentation to all (10) industrial teachers and key administrative staff in the system. Very favorable response indicated for the IACP concept. Continued interest seemed likely.

FEBRUARY, 1971

Curriculum Articulation Conference held on February 20, on the Eastern Michigan University campus. Attendance included 150 public school teacher, administrators and school board officials, and 35 Eastern Michigan University faculty and students. An evaluation of the conference since that date has provided information indicating a very favorable attitude toward the Project as a curriculum innovation. The conference was also judged as quite effective in its description of the Project and teaching problems associated with its use in the schools. See Appendix B for the conference program.

Prepared mailing materials to direct information to all public school superintendents in the State of Michigan. Final mailing list included 700 names and addresses. Focus of letter in the mailing was again upon the availability of the IACP as a junior high school curriculum, and a state disseminator. See Appendix C for a sample of the mailing materials.

Received inquiries from the following:

Monroe Public Schools; Mr. Kent Ackerman, Director of Vocational Education. Plans were made to make presentation to teachers in the Monroe schools.

Livonia Public Schools; Mr. William Warren, junior high school administrator and Mr. Joseph Costa, teacher of industrial arts at Emerson Junior High School. Plans were made to speak at Emerson.

Ferris State College; Mr. Paul Prins, Instructor, Industrial Department.

Visits made to the following:

Monroe Public Schools. Made presentation to all (15) industrial teachers. A rather strong indication of interest in implementation was expressed. The director of vocational education is hopeful for at least a pilot effort in use of the Project for 1971-72. Monetary problems may hinder such an effort.

Midland Public Schools. Made presentation to all (20) industrial teachers and administrators in the Midland schools. Very favorable response was received toward uniqueness of the Project. Since that date a visit has been made to the Pontiac demonstration center by four of the persons who attended the presentation. At least two teachers are very hopeful of implementing the Project in one junior high school.

Flint Public Schools. Held meeting with the director of vocational education and his assistant to discuss feasibility of expanding the "industrial technology" concept to include additional schools. Two of the eight junior high schools in Flint are presently using a curriculum similar to the IACP.

Jackson Intermediate School District. Made presentation to group of five teachers and administrators representing three schools in that district. Interest of deputy superintendent was very high. His hope is to work on individual schools through the Spring.

General Motors Institute, Flint. Made presentation to 14 Flint Public School administrators and teachers representing the eight Flint junior high schools. Meeting arranged by GMI administrator who expressed very strong interest in the IACP.

Society of Manufacturing Engineers, Dearborn. Held conference with SME director of education, Mr. Jon Grove.

Andrews University, Berrien Springs. Made presentation to group of 15 teachers who represent the faculties of the five Seventh Day Adventist academies in the midwest. A strong interest was indicated by two of the teachers who may enroll in summer study programs on the IACP.

MARCH, 1971

Received inquiries from the following:

Utica Public Schools; Mr. William Palm, Coordinator of Industrial Arts. Plans were made to give presentation at in-service conference.

Tahquemenon Area Schools; Mr. Robert Monck, Industrial Arts Department. Request for visit to Pontiac demonstration center was made.

Akron-Fairgrove Schools; Mrs. Irene Westerby, Junior High Principal. Request for more information on the IACP.

Dearborn Heights, Westwood Community Schools; Mr. Robert Schmuck, Assistant Superintendent. Plans for visit to discuss the Project were made.

Chassell Township School District; Mr. Edward J. Huls, Superintendent. Request for more information on the Project and a visit by disseminator to discuss the Project was made.

North Branch School District; Mr. Dean Badertscher. Request for more information on the Project.

Southgate Community School District; Mr. Robert I. Stipe, Assistant Superintendent. Request for more information on the Project.

Visits made to the following:

Livonia, Emerson Junior High School. Made presentation to curriculum coordinating council for Emerson School. The industrial arts teacher, Mr. Joseph Costa is working very hard to encourage acceptance of the IACP for 1971-72, as he is a trained teacher in use of the Project. Such a curriculum change must be accepted by the curriculum council.

Flint Public Schools. Held planning session with the assistant director of vocational education on the feasibility of implementing the IACP in three additional schools in Flint.

Ypsilanti Public Schools. Spoke with cooperative education instructor who is working to encourage acceptance of the Project in the Ypsilanti schools.

Saginaw Arthur Hill High School. With the assistance of Mr. Leroy Williams of Pontiac, made presentation to 75 industrial teachers and administrators of the Saginaw Valley Industrial Education Association. Generally favorable response received with 3-4 teachers asking extended questions about how they might become involved in teaching with Project materials.

Muskegon Community College. Made presentation to graduate extension class of the University of Michigan. Program arranged by Mr. Paul Prins of Ferris State College. Response of class quite favorable. Class included 25 vocational teachers and coordinators.

Ypsilanti Public Schools. Held conference with superintendent of schools and cooperative education instructor. Hope for implementing the IACP on a pilot basis contingent upon successful millage election, as the school system is facing monetary crisis for 1971-72.

Utica Public Schools. Made presentation to all industrial teachers and administrators (15 total). Response to IACP quite favorable. It is the hope of the director of vocational education to implement the Project on a pilot basis in at least one junior high school.

Dearborn Heights, Westwood Community Schools. Made presentation to director of curriculum and members (4) of the administrative staff. Response quite favorable with expectation of implementation in one school if teacher can be found to take summer study program on the use of the Project materials.

Flint Public Schools. Held meeting with director of vocational education and assistant superintendent in charge of instruction on the possibility of implementing the Project in five junior high schools. Possibility depends upon the interest of available teachers in taking summer study course.

Summary of Dissemination Experiences.

In studying the frequency and geographical distribution of inquiries received about the Industrial Arts Curriculum Project, it would seem that the following observations are worth noting:

1. Interest in the IACP did not begin to develop until January, 1971, except in those school systems where contacts had been made during the previous school year.

2. Increased interest is being shown in the possibilities for implementing the Project in a number of school systems, particularly in the Greater Detroit area. The establishment of pilot schools in each of the respective systems appears to be a more desirable starting point than total implementation, as indicated by the interests of school administrators.

3. Two major problems appear to bother the administration of school systems that have shown most persistent interest in implementation. These are the availability of the $5,000 to $7,000 required for implementation and the availability of a teacher or teachers who would be willing to spend time in a summer study program at a local university. The monetary crisis in Michigan during this school year, and as projected for the 1971-72 school year, has created many doubts about the possibilities of revenue being available in school budgets.

4. Since the momentum for dissemination and eventual implementation seems to be just developing on a statewide basis, it would appear that an effort should be extended through at least another nine months to provide continued follow-up and information on the implementation process for the Project. Many schools that are beginning now to show interest in the Project cannot possibly implement the program during the 1971-72 school year. They may extend further their interests, though, if so encouraged at the start of the 1971-72 school year in September, 1971.

Addendum to Mid-Year Report on a
Dissemination Program for the
Industrial Arts Curriculum Project

Following is a continuation report of dissemination activities undertaken by Dr. Gerald L. Jennings during the period of April 1-May 30, 1971.

APRIL, 1971

Received inquiries from the following:

Benton Harbor Area Schools; Mr. Neal Blinkman, Director of Vocational Education. Letter indicated a definite intent to initiate the IACP in one school with seventh and eighth grade. Desired to enroll instructor in summer workshop at Eastern Michigan University.

Redford Union School District; Mr. James C. Miller, teacher of industrial arts. Letter indicated intent to teach with IACP materials as school district administration was indicating intent to implement the IACP program. Teacher enrolled in the summer course in the Project at Eastern Michigan.

New Haven Community Schools; Charles M. Uhazie, Superintendent. Requested information on the Project. A packet was mailed including several pieces of literature.

Albion Public Schools; Mr. Ronald Gant, teacher of industrial arts. Requested information for enrollment in the summer school program for the Project at Eastern Michigan University. A packet was mailed including registration material.

Romeo Junior High School; Mr. Jerome P. Byville, teacher of industrial arts. Requested registration material for the summer school program on the Project. A packet of registration material was mailed.

Houghton, Michigan; Mr. Lloyd C. Schuster, teacher of industrial arts. Requested registration material for the summer school program for the Project. A packet of material was mailed.

Okemos, Michigan; Mr. Frank Lucas, teacher of industrial arts. Requested registration material on the summer school courses on the Project. A packet of material was mailed.

Karlsruhe American High School, Germany; Mr. Clyde Born, teacher of Industrial Arts. Requested summer school registration material for courses on the Project. Literature and a packet were mailed.

Visits made to the following:

The Associated General Contractors, Detroit Chapter. Submitted mid-year report on the dissemination program to officials of the Detroit Chapter, AGC.

Eaton County Intermediate School District, Charlotte. Made a presentation on the Project to twelve school administrators representing Eaton County schools. Specific interest was indicated by the Okemos schools. The program was arranged by Mr. Roger LaBonte, Director of Vocational Education in the intermediate school district. Mr. LaBonte expressed a great deal of interest in the Project.

MAY, 1971

Received inquiries from the following:

Ypsilanti Public Schools; Mr. Allan Townsend, Principal. Requested a meeting to discuss program implementation procedure.

Wexford-Missaukee Intermediate Schools, Cadillac; Mr. Robert Deck, Vocational Consultant. Requested presentation for school teachers and administrators in intermediate school district.

Ecorse Public Schools; Mr. Arthur Casanova, Director of Vocational Education. Requested presentation for school teachers and administrators in the Ecorse schools.

Visits made to the following:

Plymouth Public Schools. Made presentation to twelve industrial arts teachers from Plymouth Schools. Interest in the Project was not immediately evident. Meeting was arranged by Mr. Tim Bortles, teacher of industrial arts, Plymouth.

Cadillac Intermediate School District. Made presentation to six teachers and administrators from this school district. Interest in the Project was not immediately evident. Meeting was arranged by Robert Deck, Vocational Consultant.

Ecorse Public Schools. Made presentation to five teachers and administrators from this school district. Rather strong interest was indicated by two teachers, one of which is enrolled in the summer school IACP program at Eastern Michigan University.

Ypsilanti Public Schools. Planning conference held with teachers and administrators to conclude planning for implementation of the Project. World of Manufacturing classes are to be introduced in the East Jr. High School beginning in September, 1971.

Michigan Industrial Education Society Convention, Lansing. Assisted the Pontiac schools in preparing a display booth in the convention arena to show the status of the Project in the Pontiac demonstration center. Spent considerable time discussing the Project with various teachers and administrators during the three-day convention, May 13, 14 and 15. Booth included samples of class activities with enlarged photographs of students working, a slide-tape presentation on the Project and display of literature on the Project. Teachers from the Pontiac junior high schools worked in the booth to meet with and discuss the Project with interested conventioneers. Over-all interest in the display of Project materials was quite high.

Flint Public Schools. Plans were finalized to implement the Project in five Flint junior high schools beginning in September, 1971. Also a pre-school teacher workshop was scheduled to provide in service training in Flint for teachers who will work with the IACP materials in the Fall. That workshop is to be directed by Dr. Jennings in Flint, August 23 to September 3, 1971.

Concluding Comments:

The last two months (April and May) of this school year have revealed definite plans by several school districts to implement the IACP program beginning in September, 1971. These included the following:

Flint - five junior high schools (Construction and Manufacturing)
Benton Harbor - one junior high school (Construction)
Ypsilanti - one junior high school (Construction)
Livonia - one additional junior high school (Construction)
Redford Union - one junior high school (Construction)
Carman - one junior high school (Construction)

Other school districts that have shown a persistent interest in the Project, but which have not been able to fulfill requirements in terms of either funding, staffing or scheduling to permit implementation beginning in September, include the following:

Saginaw Public Schools
Midland Public Schools
Monroe Public Schools
Detroit Public Schools
Okemos Public Schools

Efforts will be continued by Dr. Jennings to encourage these school systems to pursue means for implementation for the 1972-73 school year, in view of the difficulty of beginning in September, 1971.

The dissemination program will be continued through December, 1971, at which time it is anticipated the funds for expenses incurred by Dr. Jennings will be depleted. It is hoped that interested school districts can be contacted to provide consultant services they would feel needed from Dr. Jennings by December.

APPENDIX A

Eastern Michigan University
Ypsilanti, Michigan [illegible]

Dear Sir:

This letter is presented as an announcement and an invitation. It is serving to introduce the presence of a new junior high school industrial arts curriculum, which you might consider investigating as having value and relevance for your community junior high schools. The invitation here is directed at offering your school system my services in an effort to obtain more complete information about this curriculum.

The enclosed brochures describe the Industrial Arts Curriculum Project (IACP) as a new approach for teaching industrial arts. It is in fact very different from existing prescribed approaches for teaching industrial arts. The investment of time, finances and human resources in preparing this curriculum represents the greatest total expenditure ever given on a coordinated basis to the improvement of industrial arts curricula.

During this past school year (1969-70) the Pontiac Public Schools conducted a demonstration program using the IACP in three of its junior high schools. That pilot program was supported by the State Department of Education, Bureau of Research, in its effort to study the feasibility of the IACP as a valid and relevant curriculum for the typical community school in Michigan. This year (1970-71) that program has been extended to include additional teachers and schools in Pontiac, and to offer a chance for further study and demonstration of the IACP. An outcome of that demonstration center effort has been increased interest in the IACP by a number of school systems that observed it in action, as well as an expressed desire for teacher education in the IACP. The Department of Industrial Education at Eastern Michigan University is attempting to assist in offering professional services in line with those interests.

Three primary services are being offered your school system for the study and implementation of the IACP during this school year. These services are:

Department of Industrial Education
(313) 487-1130

1. Visitation to your community to offer a first-hand description of the IACP will be made by me upon request if and when it can be scheduled during the school year. It is intended that such a visit provide a means to "tell the story" of the IACP to teacher, administrative or parent groups. This visitation would be made at no expense to your school system as these services are being supported through a curriculum dissemination project supported by the State Department of Education, Eastern Michigan University and the Associated General Contractors.

2. A first-hand look at the IACP in action can be taken in the Pontiac demonstration schools. A standing invitation exists for any Michigan teachers or administrators to visit Pontiac and the classrooms where this program is now being implemented. Such visits may be arranged either through me at Eastern Michigan University or by contacting Mr. Donald Kaiser, Consultant for Industrial Arts, Northern High School, Pontiac.

3. Teacher education programs to prepare your industrial arts teachers to use the IACP curriculum materials are being scheduled for the summer semester, 1971 at Eastern Michigan University. It is believed that this curriculum is too complex and difficult for a teacher to pick up the text materials and use without proper orientation to its structure. Publishers of these materials, McKnight and McKnight Publishers, will not sell them to school systems where teachers have not been properly oriented to teach with them through study in a teacher education program.

In conclusion, if you feel you would like to gain additional information and background about the IACP or schedule a visit by me to your community, either write or call me at Eastern Michigan University.

Sincerely yours,

Gerald L. Jennings

Dr. Gerald L. Jennings, Associate Professor
Department of Industrial Education

ARTICULATION CONFERENCE IN INDUSTRIAL EDUCATION
Industrial Arts Curriculum Project
Saturday, February 20, 1971

8:30- 9:15

Registration and Coffee
Lobby, Sill Hall
(Tours of Sill Hall will be conducted until 9:10)

9:15-10:45

General Assembly
Sill Hall, Lecture Room 1

Welcome:
Mr. Harold PaDelford
Conference Co-Chairman

Introduction:
Dr. Harold Sponberg, President
Eastern Michigan University

Keynote Address:
Dr. Willis E. Ray, Co-Director
IACP, Ohio State University

Announcements:
Mr. John Weeks
Conference Co-Chairman

10:45-11:45

Small Group Sessions
The World of Construction
Room 215
Chairman: Dr. Delmar Larsen
Recorder: Mr. Al Roth
Presenter: Mr. Charles Hall

The World of Construction
Gallery
Chairman: Dr. Ronald Baird
Recorder: Mr. Harry Smith
Presenter: Mr. Leroy Williams

The World of Manufacturing
Room 137
Chairman: Dr. H. James Rokusek
Recorder: Mr. Herbert Wilson
Presenter: Mr. John Hovis

The World of Manufacturing
Room 135
Chairman: Dr. Clois Kicklighter
Recorder. Mr. Carroll Osborn
Presenter: Mr. David Book

12:00-1:00

Luncheon - McKenny Union

1:00-2:00

Small Group Sessions
The World of Construction
The World of Manufacturing

2:00-2:30

Panel Discussion
Sill Hall, Lecture Room 1

Presiding: Dr. Willis E. Ray

Panel Members:
David Book
John Hovis
Leroy Williams
Charles Hall

2:30-3:00

Final General Assembly
Sill Hall, Lecture Room 1

Presiding: Dr. Willis E. Ray

Registration:
Herbert Nelson
John Wescott
Ken Black
Richard Tincu
David Lickteig

Displays:
Paul Kuwik
Norman Delventhal
Gerald Jennings
Rich Clark
James Partridge

Hospitality:
R. A. LaBounty
Carol Barnett
Mary Moore
Connie Pichler
Robin Vedder

Tours:
Norman Risk
Larry Haller
William Frederick

Facilities:
Gene Minton
Jerald Griess
Gary Symington

Printing:
Robert Benden

APPENDIX B

WORLD OF CONSTRUCTION

Table of Contents

Man and Technology
Construction Technology
Applying Technology to People
Managing Construction
Beginning the Project
Selecting a Site
Buying Real Estate
Surveying and Mapping
Soil Testing
Designing and Engineering the Construction Projects
Identifying the Design Problem
Developing Preliminary Ideas
Refining Ideas
Engineering the Designs
Selecting the Design
Making Working Drawings
Writing Specifications
The Designing and Engineering Cycle
Selecting a Builder
Contracting
Estimating and Bidding
Scheduling
Working as a Contractor
Collective Bargaining
Hiring Construction Personnel
Training and Educating for Construction
Working Conditions
Advancing in Construction
Construction Production Technology
Getting Ready to Build
Clearing the Site
Locating the Structure
Earthmoving
Handling Grievances
Stabilizing Earth and Structures
Classifying Structures
Setting Foundations
Building Forms
Setting Reinforcement
Mixing Concrete
Placing and Finishing Concrete
Completing Foundations
Building Superstructures
Building Mass and Masonry Superstructures
Erecting Steel Frames
Erecting Concrete Frames
Building Wood Frames
Installing Utilities
Installing Heating, Cooling, and Ventilating Systems
Installing Plumbing Systems
Installing Piping Systems
Installing Electrical Power Systems
Installing Electrical Communications Systems
Making Inspections
Mediating and Arbitrating
Enclosing Framed Superstructures
Roofing
Enclosing Exterior Walls
Striking
Insulating
Applying Wall Materials
Applying Ceiling Materials
Laying Floors
Finishing the Project
Painting and Decorating
Installing Accessories
Completing the Site
Transferring the Project
Servicing Property
Building Dams
Bridge Building
Road Building
Building Skyscrapers
Constructing in the Future
Constructing Housing
Your Dream House
Selecting and Purchasing a Lot
Planning the Living Space
Preparing Working Drawings
Writing Specifications
Financing and Contracting
Building the Substructure
Building Walls
Building Floors and Ceilings
Building Roofs
Enclosing Exteriors
Roughing in Utilities
Working on the Interior
Completing the House
Landscaping Homesites
City and Regional Planning Factors
Planning Community Services
Housing People
Planning Business Facilities
Planning Schools and Recreational Facilities
The Economics of Community Development
Managing Community Development

WORLD OF MANUFACTURING

Table of Contents

Man and Technology
The Evolution of Manufacturing
Manufacturing and the Economic System
Manufacturing Technology
Manufacturing Management Technology
Inputs to Manufacturing
Organization, Ownership, and Profit
Identifying Consumer Demands
Researching and Developing
Designing Manufactured Goods
Creating Alternate Design Solutions
Making Three-Dimensional Models
Refining the Design Solution
Obtaining Approval of Management
Engineering the Product
Designing Power Elements
Making Working Drawings
Building the Production Prototype
Technical Writing and Illustrating
Planning Production
Planning Processes
Automating Processes
Measuring Work
Estimating Cost
Tooling Up for Production
Installing Production Control Systems
Operating Quality Control Systems
Designing and Engineering the Plant
Establishing Accident Prevention Programs
Supplying Equipment and Materials
Processing Data or Information
Using the Computer
Employment and Occupations in Manufacturing
Manufacturing Personnel Technology
Hiring and Training
Working, Advancing, and Retiring
Organized Labor and Collective Bargaining
Securing Reproducible Raw Materials
Extracting Raw Materials
Harnessing Energy From Nature
Manufacturing Production Technology
Converting Raw Materials to Industrial Materials
Making Industrial Materials into Standard Stock
Story of Primary Metal Products
Story of Textile Mill Products
Story of Petroleum Products
Story of Chemical Products
Making Components by Forming or Separating Standard Stock
Material Forming Practices
Casting or Molding
Compressing or Stretching
Conditioning Material
Material Separating Practices
Shearing
Chip Removing
Separating by Other Processes
Making Assemblies or Finished Products
Combining Components
Mixing
Coating
Bonding
Mechanical Fastening
Combining Subassemblies
Preparing for Distribution
Servicing Manufactured Products
Story of Printed Products
Story of Basic Machine Tools
Story of Rubber Products
Story of the Telephone
The Manufacturing Corporation
Forming a Corporation
Relating People to the Corporation
Making the Sales Forecast
Estimating Profits and Keeping Records
Locating the Plant and Securing Inputs
Designing and Engineering the Product
Planning Production Processes
Establishing Production and Quality Controls
Making and Combining Components and Assemblies
Arranging for Distribution and Sales
Liquidating the Corporation
Manufacturing in the Future

APPENDIX C

Eastern Michigan University
Ypsilanti, Michigan 48197

This letter is intended to direct your attention to a new curriculum for junior high school industrial arts. Through the highly coordinated efforts, during the past five years, of teacher educators at The Ohio State University and the University of Illinois, classroom teachers, and industrialists from throughout the nation, the Industrial Arts Curriculum Project (IACP) has produced a two-year junior high school curriculum in industrial technology.

The focus of the IACP is upon a total survey of man's practices in producing goods through organized industry. It utilizes a conceptual approach to learning and provides a tremendous array of individual and group learning experiences in describing what man does in construction and manufacturing industries.

My concern in this letter is to inform you of the efforts being directed at disseminating this curriculum in Michigan this year. Through the support of the State Department of Education, Eastern Michigan University, and the Associated General Contractors (Detroit Chapter), I have been provided time and financial support to direct information about the IACP to Michigan educators. For the remainder of the school year, I invite your inquiries about the IACP as it might offer further direction for the junior high industrial arts programs in your schools.

In this dissimination effort we will attempt to arrange visits for you to observe the IACP demonstration classrooms in Pontiac, or to provide lectures or conferences that would offer you or your teachers greater insight into the purposes and structure of this curriculum. Visits by myself for conference purposes can be arranged at no cost to your school district. Please feel free to contact me by phone or mail for further information.

Sincerely yours,

Gerald L. Jennings

Dr. Gerald L. Jennings, Associate Professor
Department of Industrial Education

cb

Department of Industrial Education
(313) 487-4330

The Department of Industrial Education
Eastern Michigan University
Ypsilanti, Michigan 48197

ANNOUNCING: JUNE 21 - JULY 30, 1971

SUMMER GRADUATE STUDY PROGRAM
with specific focus on an orientation to

THE INDUSTRIAL ARTS CURRICULUM PROJECT
and
The World of Construction (Industrial Technology I)
The World of Manufacturing (Industrial Technology II)

The schedule of graduate classes listed below provides the opportunity for any graduate student in industrial education to enroll for four (4) semester hours of graduate study in either one of the two industrial technology courses in the Industrial Arts Curriculum Project (IACP). Interested students or persons with a specific intention in teaching with IACP materials should enroll in the seminar section and one corresponding practicum section.

A

IE 593 Practicum: IACP Manufacturing Technology
9:00 - 10:25; Section 1; 2 semester hours

IE 596 Seminar: IACP Manufacturing Technology
10:35 - 11:35; Section 1; 2 semester hours

B

IE 596 Seminar: IACP Construction Technology
10:35 - 11:35; Section 2; 2 semester hours

IE 593 Practicum: IACP Construction Technology
12:10 - 1:35; Section 2; 2 semester hours

Enrollment:

Choose sequence "A" or sequence "B" for a total of four semester hours credit in IACP course work. Students will not be permitted to enroll in both "A" and "B" courses.

A student is permitted to enroll in six semester hours of graduate course work during the scheduled six week period; therefore, he may enroll in two additional semester hours of course work with either sequence "A" or "B" courses.

For further information contact:

Dr. Gerald L. Jennings, Associate Professor
Department of Industrial Education
Eastern Michigan University